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Research Article

A new subterranean species of *Entomoculia* Croissandeau, 1891 from the Canary Islands, Spain (Coleoptera, Staphylinidae, Leptotyphlinae)

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Abstract

The genus *Entomoculia* Croissandeau, 1891, is the only representative of the subfamily Leptotyphlinae present in the Canary Islands and is composed by only two species: *E.* (*Stenotyphlus*) *canariensis* Outerelo, 1982, from La Gomera and *E.* (*Stenotyphlus*) *lauricola* Outerelo & Hernández, 1989, from Tenerife, both found in deep soil (= endogean) habitats. In this paper, we describe *Entomoculia* (*Stenotyphlus*) *vulcanica* **sp. nov.**, the third Canarian species of the genus, which is reported for the first time from Gran Canaria and has been found in the mesovoid shallow substratum "MSS". This new species has some of the characteristics that are specific to Canarian species of the genus *Entomoculia*, such as the lack of a denticle or spiniform process on the male metatrochanters. However, it is a remarkable species as it is the only known species of the genus with a tridentate labrum, as the labrum is monodentate in the species so far known from Canary Islands and bidentate in non-Canary species. We provide a key to Canarian species and illustrations of the habitus and the primary and secondary sexual characters of the male. We also describe the sampling techniques used and provide detailed information on habitat characteristics and associated arthropod fauna.

Key Words

endemics, islands, Macaronesia, new species, rove beetles, taxonomy

Introduction

The staphylinid genus *Entomoculia* Croissandeau, 1891 includes exclusively anophtalmic and wingless endogean beetles, represented by 135 species and subspecies organised in two subgenera: the nominotypical *E.* (*Entomoculia*) and *E.* (*Stenotyphlus*) Coiffait, 1955. Its species are distributed in the western Palearctic: western Mediterranean Europe (Spain, France and Italy), the Maghreb (Tunisia, Algeria and Morocco) and the Canary Islands (Outerelo 1980, 1982; Outerelo and Hernández 1989; Hernando 2013, 2015, 2022; Schülke and Smetana 2015; Assing 2018). In the Canary Islands, *Entomoculia* includes two endemic species: *Entomoculia* (*Stenotyphlus*) *canariensis* Outerelo, 1982 (= *E.* (*S.*) *viti* Outerelo, 1980) from La Gomera and *Entomoculia* (*Stenotyphlus*) *lauricola* Outerelo & Hernández, 1989 from Tenerife (Machado and Oromí 2000; Oromí et al. 2004), both species being characterised by having a monodentate labrum and male metatrochanter lacking denticle or spiniform process, unlike the non-Canarian species with a bidentate labrum and male metatrochanter with a denticle or spiniform process. This article is the result of studies carried out on Gran Canaria regarding the biodiversity of invertebrates from the mesovoid shallow substratum (henceforth referred as MSS; see Juberthie et al. (1980); Culver and Pipan (2010)). Some individuals of *Entomoculia* belonging to a new species were found, which are characterised by being the only known species of the

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genus with a tridentate labrum and which we describe here. The discovery of this *Entomoculia* in this underground substratum probably shows that species of this genus inhabit the continuum represented by endogean and hypogean environments, as do other beetle genera that include species living in both types of habitats (García et al. 2021).

Material and methods

Specimens of a new species were collected using special permanent pitfall traps according to López and Oromí (2010), installed in the MSS of Gran Canaria (Canary Islands). Four traps were set in the type locality in 2006, baited with blue cheese or liver and surveyed each four months until 2023. After this sampling time, we collected four specimens of a new species of *Entomoculia* on whose examination this study is based.

The aedeagus was dissected from the abdomen of a specimen previously softened in boiling water for 5 minutes. After examination, genitalia were mounted on plastic transparent cards in dimethyl hydantoin formaldehyde resin (DMHF) and pinned beneath the specimen. All images were taken using a Canon EOS 50D digital camera attached to a Zeiss Axiostar plus compound microscope. Serial images were stacked with Helicon Focus 8.2.3 software. Measurements were taken with a linear ocular micrometer and given in millimetres. The label data are reproduced verbatim; within the label data, a slash "/" indicates line breaks.

Type material of the new species is deposited in the following collections:

CHC Personal collection of C. Hernando, Badalona, Catalonia, Spain.

IPNA Institute of Natural Products and Agrobiology (IPNA-CSIC), La Laguna, Tenerife, Canary Islands, Spain.

Results

***Entomoculia* (*Stenotyphlus*) *vulcanica* sp. nov.**

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Figs 1–6

Type locality. Caldera de Los Marteles, MSS, UTM 28R 448100/3092038, Gran Canaria, Canary Islands, Spain.

Type material. ***Holotype*** ♂ CANARY ISLANDS: "GRAN CANARIA / Caldera de Los Marteles MSS-2 / UTM 28R 448100/3092038 / 22-05-2021, H. López leg." (IPNA). ***Paratypes*** 1 ♀: "GRAN CANARIA / Caldera de Los Marteles MSS-1 / UTM 28R 448100/3092038 / 07-12-2009, H. López leg." (CHC); 1 ♂: "GRAN CANARIA / Los Majaletes MSS-2 / UTM 28R 450511/3091134 / 26-12-2010. H. López leg." (CHC); 1 ♂: "GRAN CANARIA / Caldera de Los Marteles MSS-1 / UTM 28R 448100/3092038 / 26-03-2016, H. López leg." (IPNA).

Description. Male. Habitus as in Fig. 1. Body length: 1.7 mm. Colour: entirely depigmented (reddish-brown). Apterous and anophthalmous. Labrum tridentate (Fig. 2). Antennae with ten antennomeres (Fig. 1). Metatrochanter unarmed, without denticles or spiniform process. Morphology of aedeagus characteristic, sternal plate long and narrow, with the external margin serrated, endophallus with two accessory pieces: one dorsal, forked at apical end and another central and stiletto-shaped.

Head elongated, slightly wider than the pronotum, almost parallel-sided, with punctation widely scattered over whole surface, neck well marked, entirely covered by an elongated polygonal reticulation and with two longitudinal series of small setal pores on both sides of the neck (Fig. 1). Labrum tridentate with two small lateral denticles and protruding median denticle, bearing eight long setae (Fig. 2). Antennae with antennomeres markedly setulate (especially the last one) progressively increasing in size from the third antennomere onwards, ending with the last very thickened (Fig. 1).

Pronotum as long as wide and widest at anterior angles, subparallel-sided; anterior and posterior margins almost straight and anterior and posterior angles rounded; surface covered with small, scattered punctation, with very short setae (Fig. 1).

Elytra small and strongly narrowed at base; distinctly narrower than pronotum and subparallel (Fig. 1); surface covered by punctation similar to that on pronotum and by an isodiametric polygonal microsculpture.

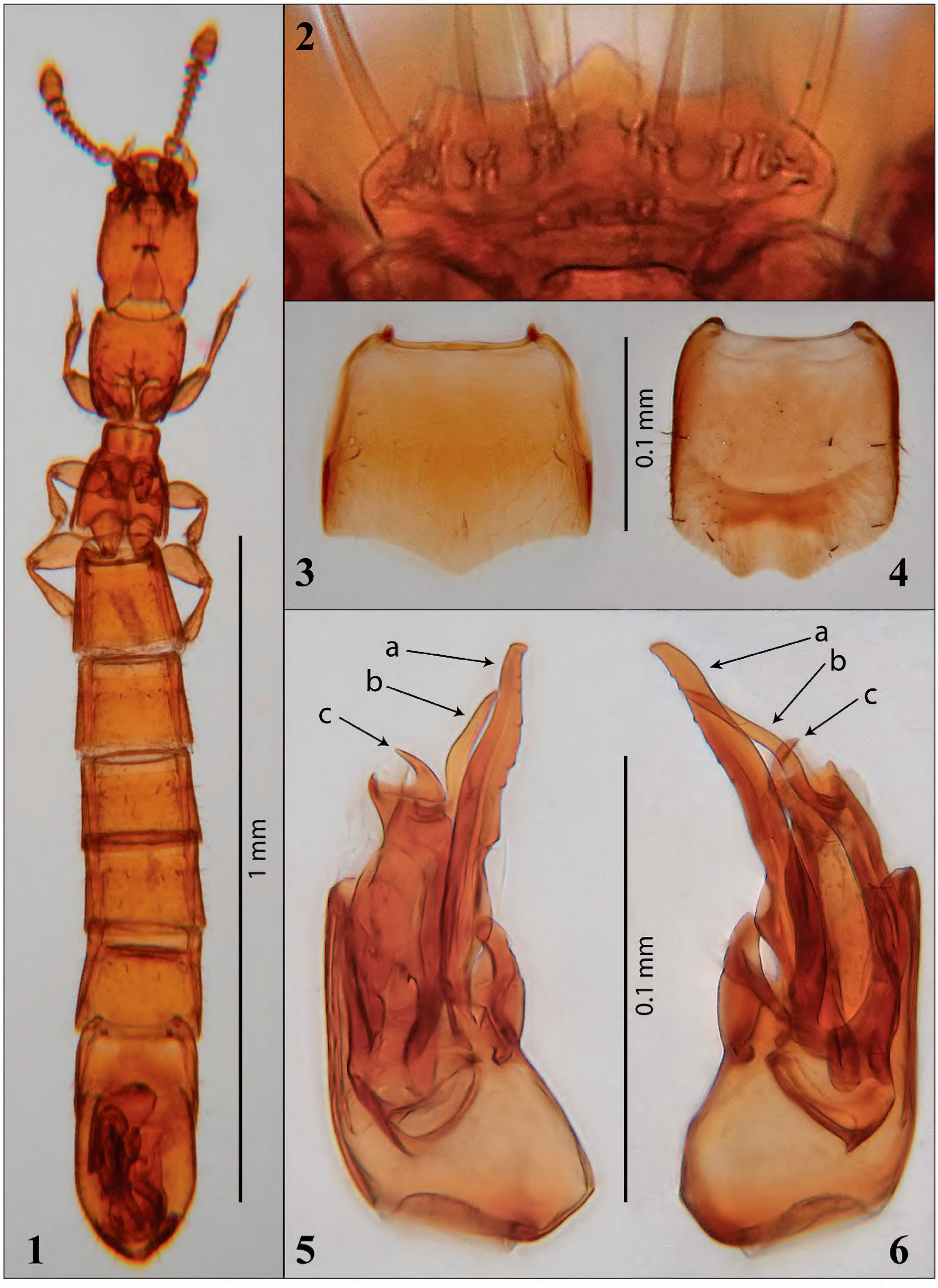
Abdomen tergites with polygonal reticulation and widely scattered punctation; the first visible tergite is trapezoidal and the second to fifth tergites quadrangular; tergite VIII posterior margin regularly projected into a point at middle (Fig. 3). Sternite VIII symmetrical, posterior margin with small median excision bearing two distinct blunt protuberances on both sides (Fig. 4).

Legs with the metatrochanter unarmed, without denticles or spiniform process.

Aedeagus. Sternal plate long and narrow, with the external margin serrate (Figs 5a, 6a); endophallus with two accessory pieces (i.e. copulatory pieces *sensu* Coiffait (1959)): one dorsal, forked at the apical end (Figs 5c, 6c) and other central and stiletto-shaped (Figs 5b, 6b).

Female. General appearance as the male, except for unmodified sternite VIII.

Differential diagnosis. *Entomoculia vulcanica* sp. nov. is very similar, at least in one of the characters of the external morphology, to the two species known from the Canary Islands: *E. canariensis* from the Island of La Gomera and *E. lauricola* from the Island of Tenerife. This character is the metatrochanter of the male, without denticle or spiniform process; however, *E. vulcanica* sp. nov. is separated from both, besides the morphology of the aedeagus and sternite VIII clearly different, by having the labrum tridentate (Fig. 2), with only one denticle in the other two Canarian species. The new species differs completely from all non-Canarian species of the genus,



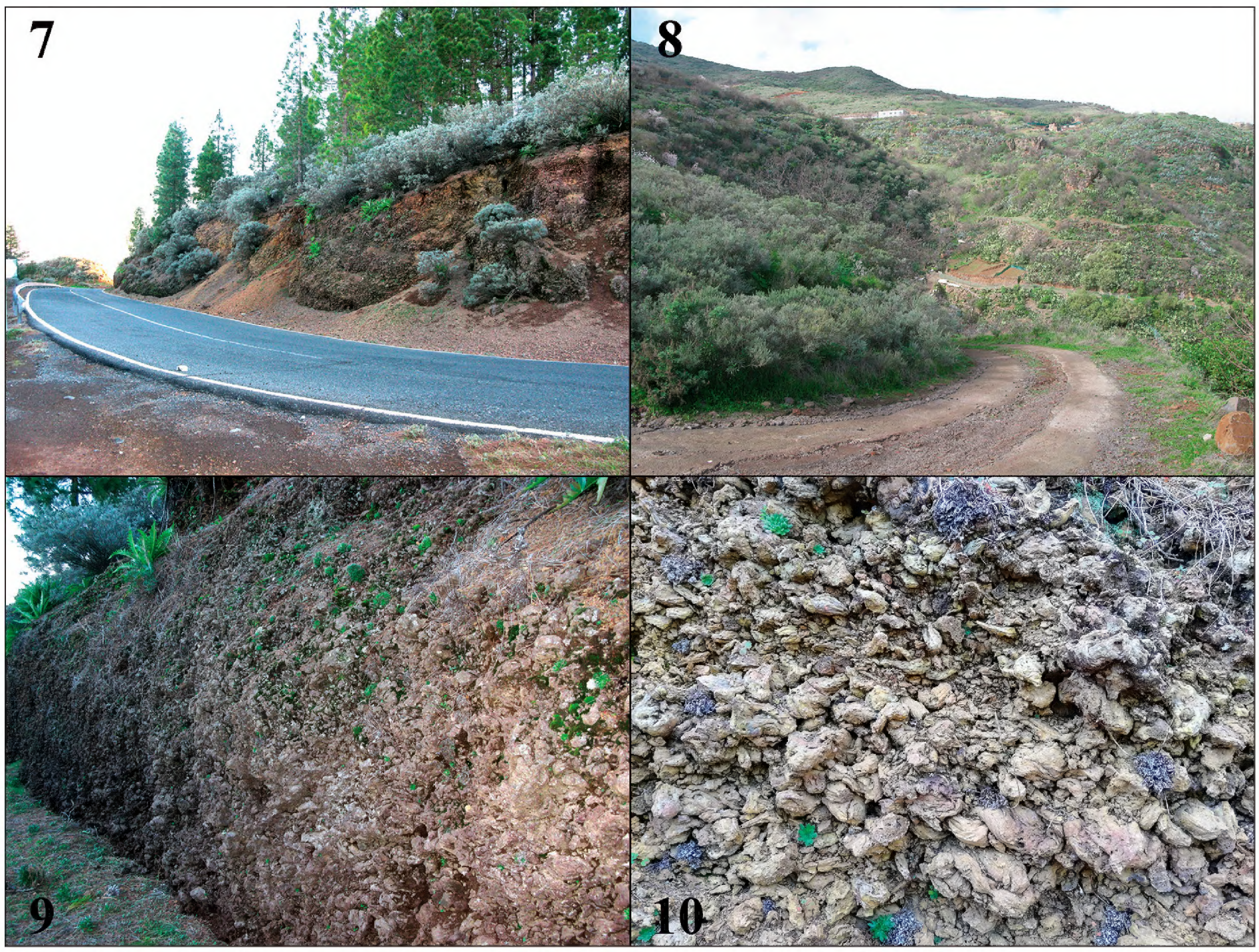
Figures 1–6. *Entomoculia* (*Stenotyphlus*) *vulcanica* sp. nov. **1.** Habitus in dorsal view; **2.** Labrum in dorsal view; **3.** Male tergite VII; **4.** Male sternite VIII; **5.** Aedeagus in right lateral view; **6.** Aedeagus in left lateral view; **a)** Sternal plate; **b)** Dorsal accessory piece; **c)** Central accessory piece.

as these have the labrum with two denticles and the metatrochanter of the male armed with a denticle or spiniform process. For illustrations of the aedeagus, male sternite VIII and labrum of *E. canariensis* and *E. lauricola*, see Outerelo (1980) and Outerelo and Hernández (1989).

Distribution. So far, only two nearby collecting sites are known around the Caldera de los Marteles in the north-eastern sector of the Island, also called Neocanaria in geological terms, which has a higher diversity of subterranean species compared to the rest of the Island or Paleocanaria (Naranjo et al. 2020).

Bionomics. This new species has been collected in the central east region of the Island of Gran Canaria, in two nearby localities showing slight geological and floristic differences. The locality described in labels as "Caldera de Los Marteles" is, in fact, a pyroclastic cinder cone near the volcanic caldera, comprised of 1–6 cm lapilli, volcanic bombs, and slag (up to 70 cm) (Figs 9, 10). In turn, Los Majaletes is located at a lower altitude and is geologically characterised by stacks of massive basalt flows up to 2–3 m thick with interspersed scoriaceous layers that must function as a deep MSS. The vegetation at Caldera de Los Marteles is dominated by a pine woodland of *Pinus canariensis* C. Sm., with clearings occupied by shrubby vegetation with *Adenocarpus foliolosus* (Aiton) DC., *Chamaecytisus proliferus* (L. f.) Link, *Euphorbia regis-jubae* J. Gay, *Micromeria benthamii* Webb & Berthel. and *Teline microphylla* (DC.) P. E. Gibbs & Dingwall (Fig. 7). At Los Majaletes, the pines are absent, the vegetation being dominated by the same assembly of bushes (Fig. 8).

The model of a subterranean trap, used to study the biodiversity of the MSS at these two localities, has led us to discover a rich underground invertebrate community of many different taxonomical groups. Most of this fauna are epigean species non-adapted to subterranean life, which penetrate through the fissures of the soil until reaching the MSS, attracted by the bait in the traps or because the environmental conditions of this habitat are suitable for part of their life cycle. However, what is really striking about the MSS of these two localities is the amount of differently adapted subterranean species that we have collected there over the years, using this model of trap. Together with this new species of *Entomoculia*, we have collected the pseudoscorpion *Occidenchthonius beieri* Zaragoza, 2017; the spiders *Agraecina canariensis* Wunderlich, 1992, *Walckenaeria subterranea* Wunderlich, 2011 and undescribed blind species of the genera



Figures 7–10. Habitat of *Entomoculia* (*Stenotyphlus*) *vulcanica* sp. nov. **7.** Appearance of the vegetation in Caldera de Los Marteles; **8.** Appearance of vegetation at Los Majaletes; **9.** Terrain of cinder cone excavated in road construction near Caldera de Los Marteles, showing the presence of an MSS; **10.** Detail of pyroclastic deposit that forms the MSS in the same cinder cone.

Dysdera Latreille, 1804 and *Macarophaeus* Wunderlich, 2011; a new species of blind opilion, the millipede *Dolichoiulus oromii* Enghoff, 2012; the cockroach *Symploce microphthalma* Izquierdo & Medina, 1992; together with new blind species of the beetle genera *Lymnastis* Motschulsky, 1862 (Carabidae), *Euconnus* Thomson, 1859, *Domene* Fauvel, 1872 (Staphylinidae) and *Oromia* Alonso-Zarazaga, 1987 (Curculionidae).

Etymology. The specific name refers to the presence of this new species on a volcanic island.

Discussion. For the moment, all the Canarian species of the genus *Entomoculia* are characterised by lacking a denticle or spiniform process on the metatrochanter of the male and by having a different number of denticles on the labrum (one or three), compared to non-Canarian species of the genus; with the metatrochanter of the male armed with a denticle or spiniform process and with the labrum bidentate. Due to these morphological peculiarities, Outerelo and Hernández (1989) considered that the Canarian species of *Entomoculia* could be included in a new subgenus or even in a genus that presents a series of characters shared with the genera *Entomoculia* and *Mesotyphlus* Coiffait, 1957, although it could be that this is only a distinct group of species belonging to the genus *Entomoculia* that are found exclusively in the Canary Islands. Further molecular data and morphological studies of the Canarian species of *Entomoculia* will probably provide the necessary data to establish their correct taxonomic position.

Key to the species of the genus *Entomoculia* from the Canary Islands

1	Labrum bidentate; male metatrochanter with a strong denticle or spiniform process	**non-Canary species**
–	Labrum monodentate or tridentate, male metatrochanter lacking denticle or spiniform process	**2**
2	Labrum monodentate; aedeagus with external margin of sternal plate smooth	**3**
–	Labrum tridentate; aedeagus with external margin of sternal plate serrate	***E.* (*S.*) *vulcanica* sp. nov.**
3	Sternal plate in lateral view, very broad and falciform, endophallus with accessory pieces shorter than the sternal plate	***E.* (*S.*) *canariensis* Outerelo, 1982**
–	Sternal plate in lateral view narrow and slender, endophallus with accessory pieces of the same length as the sternal plate	***E.* (*S.*) *lauricola* Outerelo & Hernández, 1989**

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References

Assing V (2018) On the subterranean Staphylinidae fauna of South Spain. Koleopterologische Rundschau 88: 23–41.

Coiffait H (1959) Monographie des Leptotyphlites (Col. Staphylinidae). Revue Française d'Entomologie 26(4): 237–437.

Culver DC, Pipan T (2010) The Biology of Caves and Other Subterranean Habitats. Oxford University Press, 254 pp.

García R, Andújar C, Oromí P, Emerson B, López H (2021) Three new subterranean species of *Baezia* (Curculionidae, Molytinae) for the Canary Islands. Subterranean Biology 38: 1–18. https://doi.org/10.3897/subtbiol.38.61733

Hernando C (2013) Una notable nueva especie del género *Entomoculia* Croissandeau, 1891 de Marruecos noroccidental (Coleoptera: Staphylinidae: Leptotyphlinae). Heteropterus Revista de Entomología 13(2): 117–121.

Hernando C (2015) Dos nuevos Entomoculini del noreste ibérico (Coleoptera: Staphylinidae: Leptotyphlinae). Heteropterus Revista de Entomología 15(1): 1–8.

Hernando C (2022) *Entomoculia* (*Stenotyphlus*) *maresmensis* sp. nov. from Catalonia (Iberian Peninsula) (Coleoptera: Staphylinidae: Leptotyphlinae). Studies and Reports Taxonomical Series 18(2): 345–347.

Juberthie C, Delay B, Bouillon M (1980) Extension du milieu souterrain en zone non-calcaire: description d'un nouveau milieu et de son peuplement par des coléoptères troglobies. Mémoires de Biospéologie 7: 19–52.

López H, Oromí P (2010) A pitfall trap for sampling the mesovoid shallow substratum (MSS) fauna. Speleobiology Notes 2: 7–11.

Machado A, Oromí P (2000) Elenco de los Coleópteros de las Islas Canarias. Instituto de Estudios Canarios, La Laguna, 306 pp.

Naranjo M, López H, Martín S, Suárez DB, Oromí P (2020) Troglobionts of Gran Canaria, Life under the volcano. CAM- PDS Eds., Las Palmas de Gran Canaria, 105 pp.

Oromí P, Machado A, Zurita N, García A, Martín E (2004) Orden Coleoptera. In: Izquierdo I, Martín JL, Zurita N, Arechavaleta M (Eds) Lista de especies silvestres de Canarias (hongos, plantas y animales terrestres) 2004. Consejería de Medio Ambiente y Ordenación Territorial, Gobierno de Canarias, 208–247.

Outerelo R (1980) La subfamilia Leptotyphlinae nueva en Canarias. *Entomoculia* (*Stenotyphlus*) *viti* n. sp. (Col. Staphylinidae). Vieraea 10(1–2): 71–82.

Outerelo R (1982) *Entomoculia* (*Stenotyphlus*) *canariensis* n. nov. = *Entomoculia* (*Stenotyphlus*) *viti* Outerelo, 1980 (nec Coiffait, 1973). Vieraea 11(1–2): 323–324.

Outerelo R, Hernández JJ (1989) *Entomoculia* (*Stenotyphlus*) *lauricola* n. sp., de Tenerife, Islas Canarias (España) (Coleoptera, Staphylinidae). Annales de la Société entomologique de France (N.S.) 25(4): 515–520. https://doi.org/10.1080/21686351.1989.12277607

Schülke M, Smetana A (2015) Catalogue of Palaearctic Coleoptera - Leptotyphlinae. In: Löbl I, Löbl D (Eds) Catalogue of Palaearctic Coleoptera. Hydrophiloidea - Staphylinoidea 2 vols. Revised and Updated Edition. Brill Books, 360–453.